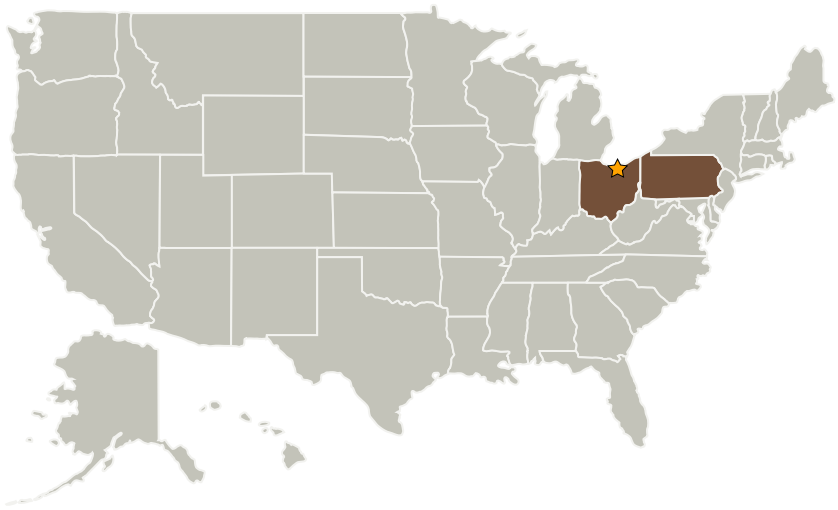
Grain Boundary Engineering for Assessing Durability and Aging Issues with Nickel-Based Superalloys, Phase II

Completed Technology Project (2008 - 2009)

Project Introduction

The Grain Boundary Engineering (GBE) approach, successfully demonstrated in Phase I, that microstructural optimization provides a very significant improvement in reducing susceptibility to intergranular crack initiation and growth in conventional wrought Inconel 718. The principal objective of the Phase II research development program is to extend the applicability of the GBE technology from conventional wrought superalloys to more advanced powder metallurgy (PM) alloys, and in particular, the Low Solvus High Refractory (LSHR) developed by NASA. In addition, the program also includes a limited effort to optimize the GBE process for application to wrought Inconel 718Plus. The phase II program will build upon the success of the phase I effort, and will have the following specific technical objectives: (1) develop and optimize GBE processing strategies for optimizing the bulk microstructure of an advanced PM disk alloy developed by NASA (i.e., LSHR) and Inconel 718Plus, (2) develop a cost-effective GBE processing strategy for locally optimizing the microstructure of the PM alloy (i.e., LSHR) at the near surface, and (3) evaluate the mechanical properties of the GBE-processed alloys and benchmark with properties of their conventional counterparts.

Primary U.S. Work Locations and Key Partners



Grain Boundary Engineering for Assessing Durability and Aging Issues with Nickel-Based Superalloys, Phase II

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Grain Boundary Engineering for Assessing Durability and Aging Issues with Nickel-Based Superalloys, Phase II

Completed Technology Project (2008 - 2009)

Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Integran Technologies USA, Inc.	Supporting Organization	Industry	Pittsburgh, Pennsylvania

Primary U.S. Work Locations	
Ohio	Pennsylvania

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.8 Measurement and Control